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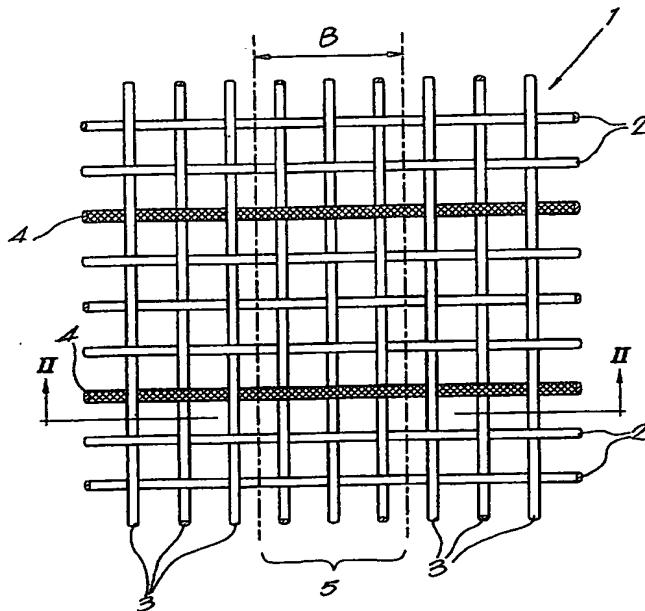
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(54) Title: CLOTH DESIGNED TO BE PROVIDED WITH AT LEAST ONE PERMANENT FOLD AND METHOD APPLIED THEREBY



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(57) Abstract: Cloth designed to be provided with at least one permanent fold, whereby at least one shrink thread is woven in said cloth, characterized in that the shrink thread or shrink threads are woven in the cloth according to a general direction extending crosswise over the folding zone.



- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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Cloth designed to be provided with at least one permanent fold and method applied thereby.

5

The present invention concerns a cloth.

In particular, the invention concerns a cloth to be provided with at least one permanent fold.

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In some cases it is desirable or necessary that a cloth has one or several folds. Thus, in some cases, a zigzag folded cloth is required.

15

From BE 2002/0267 is known a cloth designed to be provided with at least one permanent fold, whereby a cloth consisting of weft threads bound by warp threads was taken as a basis, whereby in the folding zones, where a fold is to be formed, a folding thread is woven in in the direction 20 of the warp threads by means of a shrink thread, making use of the technique of the staggering warp threads.

Although the folds that are formed in this cloth are of a good quality, the method for weaving in the folding threads 25 is time-consuming and difficult, which results in a relatively high production cost.

Moreover, it is found in practice that faults occurring during the weaving in of such a shrink thread according to 30 the technique of the staggering warp threads are difficult to detect and, as a consequence, are usually not corrected.

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The invention aims a cloth which provides a solution to the above-mentioned and other disadvantages.

5 To this end, the invention concerns a cloth designed to be provided with at least one permanent fold, whereby at least one shrink thread is woven in said cloth and whereby the shrink thread or shrink threads are woven in the cloth according to a general direction extending crosswise over  
10 the folding zone.

Preferably, at the height of the folding zone, the shrink threads will be situated over a larger distance on a single side of the cloth than outside said folding zone.

15 An advantage of the cloth according to the invention is that the shrink threads can be woven in in a simple and fast manner, such that the production speed can be driven up and the production cost can be lowered.

20 Another advantage of this cloth is that the shrink threads which have been woven in incorrectly can be easily detected before forming the folds, as the shrink threads are provided in a straight line over the folding zone.

25 The present invention also concerns a method for manufacturing a cloth with at least one permanent fold.

30 This method is characterised in that the fold, at least there where a fold should be formed, is subjected to a

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treatment to make the shrink thread or shrink threads shrink at least in said folding zone.

In order to better explain the characteristics of the invention, the following preferred embodiments of a cloth and a method according to the invention for manufacturing a cloth with at least one permanent fold are described as an example only without being limitative in any way, with reference to the accompanying drawings, in which:

10 figure 1 represents a part of the cloth according to the invention;  
figure 2 represents a section according to line II-II in figure 1 to a larger scale;  
15 figure 3 represents the part from figure 2 after a permanent fold has been formed according to the method of the invention;  
figure 4 schematically represents a view in perspective of a cloth with folds made according to the method of the invention;  
20 figure 5 represents a section according to line V-V in figure 4;  
figure 6 represents a variant of figure 3.

25 Figures 1 and 2 represent a part of a cloth 1 according to the invention, which cloth 1 is in this case woven from weft threads 2 which are bound by warp threads 3 but whereby, at regular distances from each other, in the weft direction, shrink threads 4 are woven in according to a  
30 pattern which differs from the pattern elsewhere in the

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cloth 1 at the height of folding zones 5, which in this case extend in the direction of the warp.

The difference in the weaving pattern consists in that, at 5 the height of the folding zone 5, the shrink threads 4 are situated on a single side of the cloth 1 over a larger distance than anywhere else in the cloth 1, in other words on a single side of the warp threads 3.

10 In the given example of figure 1 the folding zone 5 extends over three warp threads 3 whereby the shrink threads 4 extend on a single side of these three warp threads 3 in the folding zone 5 whereas, outside said folding zone 5, the shrink threads 4 are woven in in the same conventional manner as the other weft threads 2, namely alternately 15 above and under the successive warp threads 3.

The term 'thread' has to be interpreted in a broad sense here, which implies that monofilaments as well as yarns or 20 mixtures thereof are to be understood by it.

The yarns can be spun yarns or filament yarns, either or not textured, and even elastic yarns.

25 The thread may consist of natural material as well as of synthetic material or a combination thereof, and it can possibly be provided with a coating.

30 The weft threads 2 and the warp threads 3 can be made of different materials.

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The shrink threads 4 are made of a material which, under the influence of a thermal, mechanical/thermal, ultrasonic, high-frequency or another appropriate treatment, undergoes a permanent longitudinal shrinkage, preferably of minimum 5%.

More precisely, the shrink threads 4 are made of a material that shrinks, on application of an appropriate treatment, with at least 5% more than the material of which are made the remaining threads 2, 3 that are woven in a general direction parallel to said shrink threads 4,

10 whereby this shrinkage may be evaluated in a non-woven condition of the threads 2 to 4.

These shrink threads 4 are preferably spun of yarn which consists, partly or as a whole, of one or several synthetic fibres, of continuous filament yarn, consisting of one or 15 several synthetic filaments, of monofilament consisting of one or several synthetic base materials, or of elastic yarns or filaments.

As an example, the cloth 1 can be woven of polyethylene weft threads 2, which under influence of a thermal treatment will shrink in length with about 5 to 7%. In that case, shrink threads 4 may be used that are woven in a general direction parallel to said weft threads 2, which 25 shrink threads 4 are spun of another polyethylene material, that will shrink in length for about 30 to 35% under the influence of said thermal treatment.

In order to form a permanent fold 6, the cloth 1 is 30 subjected to the above-mentioned treatment for making the

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shrink threads 4 shrink, at least in the required folding zone 5.

It is clear that, as a result of this shrinkage of the shrink threads 4, the warp threads 3 abutting the folding zone 5 on either side of said folding zone 5 are drawn towards each other, so that the weft threads 2 are folded, as represented in figure 3.

10 The shrinkage is irreversible, which implies that a permanent fold 6 is obtained.

It is clear that the folding of the weft threads 2 towards one or other side of the cloth 1 is determined by the side 15 along which the shrink threads 4 extend over the folding zone 5.

Figures 4 and 5 represent a cloth 1 which is obtained according to the above-mentioned method of the invention 20 starting from a cloth 1, whereby the shrink threads 4 alternately extend on either side of the successive folding zones 5.

This implies that the shrink threads 4 in the cloth 1, 25 which are at the basis of the successive folds 6, successively extend unbound over the folding zone 5, on either side of the cloth 1, and thus of the warp threads 3.

The size of the shrinkage and the distance B, or in other 30 words the number of overlapped warp threads 3 over which the shrink threads 4 extend unbound on a single side of the

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warp threads 3, determine the opening of the folds 6 or, in other words, they determine how strongly the warp threads 3 are drawn towards each other on either side of the folding zone 5, and thus how large the angle A between these 5 neighbouring parts will be, provided they are free to diverge.

Naturally, the folds 6 can be pushed together, so that the parts of the cloth 1 situated between the successive 10 folding zones 5 are brought together, whereby the above-mentioned angle A is practically reduced to zero.

Figure 6 represents a variant of a part of a cloth 1 according to the invention, whereby the warp threads 3 are 15 woven farther away from each other in the folding zone 5, as a result of which the shrink threads 4 in this folding zone 5 will be automatically situated over a larger distance B on a single side of the cloth 1 than anywhere else in the cloth 1, outside the folding zone, folding 20 zones 5 respectively.

A cloth 1 with permanent folds 6 is also in this case obtained in the above-described manner by applying the treatment which makes the shrink threads 4 shrink.

25

In all the above-mentioned embodiments, a cloth 1 with dimensionally stable folds 6 is obtained which are in this case formed in the direction of the warp, whereby these folds 6 can be opened in a flexible manner.

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The cloth 1 can be any fabric whatsoever, such as a gauze or the like, with any weave whatsoever between the weft threads 2 and the warp threads 3.

- 5 The cloth 1 must not even necessarily be a fabric. It can also be a knitting or even a non-woven. In the latter case, the shrink threads 4 must be provided after the non-woven has been manufactured.
- 10 The cloth 1 provided with folds 6 can be an insect screen, a sun screen, a curtain, packaging material, a carrier bag, an attaché-case or a part thereof, the lining of a suitcase, a filtering cloth or, as a matter of fact, any object made of fabric material provided with one or several permanent folds 6.
- 15

It is clear that, in the different embodiments according to the invention, the shrink threads 4 can be woven in in the direction of the warp, whereby the folding zones 5 extend 20 in the direction of the weft if necessary.

The invention is by no means limited to the above-described embodiment represented in the accompanying drawings; on the contrary, such a cloth and such a method for manufacturing 25 a cloth with at least one permanent fold can be made in all sorts of variants while still remaining within the scope of the invention.

Claims.

- 5 1. Cloth designed to be provided with at least one permanent fold, whereby at least one shrink thread (4) is woven in said cloth (1), characterised in that the shrink thread (4) or shrink threads are woven in the cloth (1) according to a general direction extending crosswise over  
10 the folding zone (5).
2. Cloth according to claim 1, characterised in that the shrink thread, shrink threads (4) respectively, are woven in according to the direction of the weft.
- 15 3. Cloth according to claim 1, characterised in that the shrink thread, shrink threads (4) respectively, are woven in according to the direction of the warp.
- 20 4. Cloth according to claim 1, characterised in that several shrink threads (4) extend at a distance from each other over the folding zone (5).
- 25 5. Cloth according to claim 1, characterised in that, at the folding zone (5), the shrink threads (4) are situated over a larger distance (B) on a single side of the cloth (1) than anywhere else in the cloth (1) outside the folding zone, the folding zones (5) respectively.
- 30 6. Cloth according to claim 5, characterised in that the larger distance (B) over which the shrink threads (4) are

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situated on a single side of the cloth (1) is created as the shrink threads (4) extend crosswise and unbound over a few successive threads in the folding zone (5).

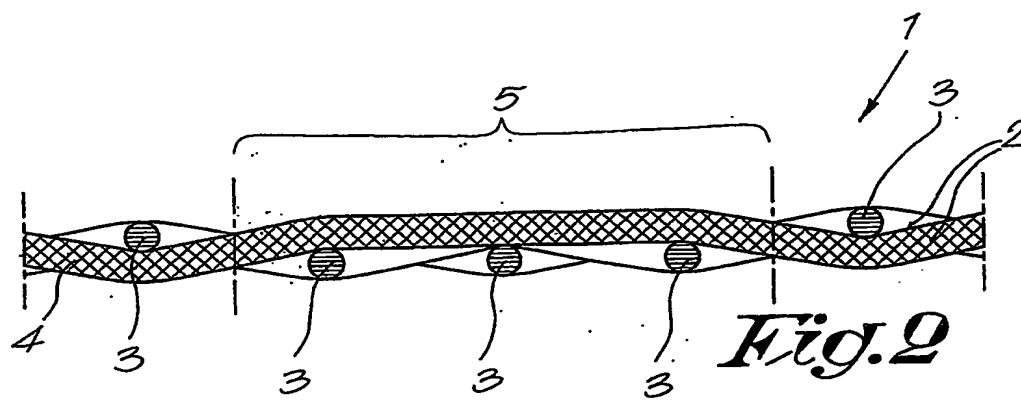
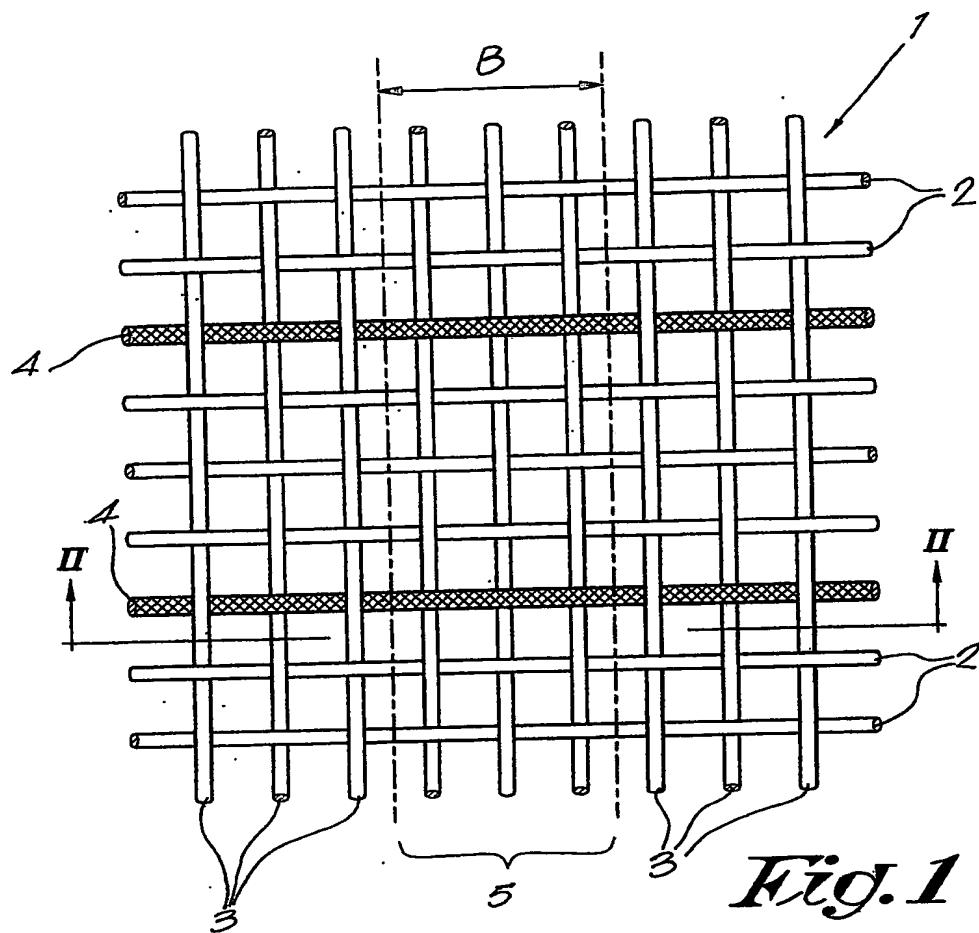
5 7. Cloth according to claim 5, characterised in that the larger distance (B) over which the shrink threads (4), are situated on a single side of the cloth (1) is created as the threads, extending in the longitudinal direction of the folding zone (5), are woven farther away from each other  
10 10 than the threads elsewhere in the cloth which run parallel to the folding zone (5).

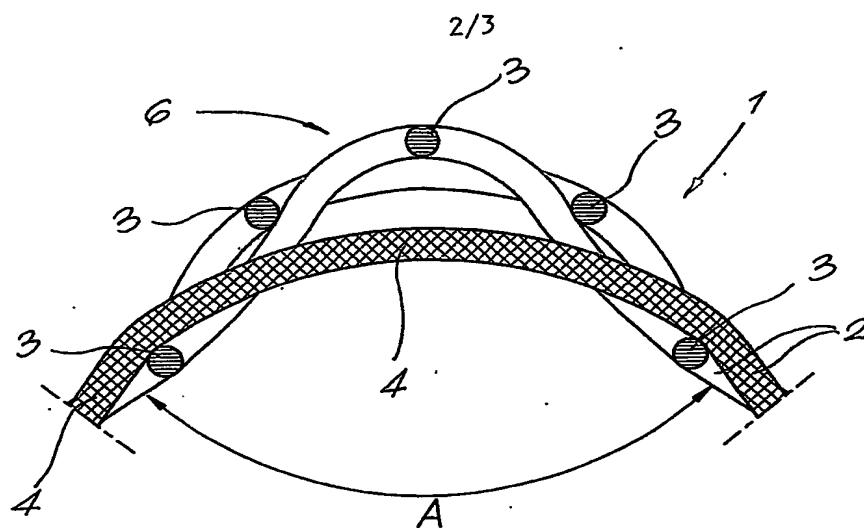
8.- Cloth according to claim 1, characterised in that the shrink threads (4) are made of a material that shrinks, on application of an appropriate treatment, with at least 5% more than the material of which are made the remaining threads (2-3) that are woven in a general direction parallel to said shrink threads (4).

20 9. Method for realising at least one permanent fold (6) in a cloth (1) according to any of the preceding claims, characterised in that the cloth (1), at least there where a fold (6) is to be formed, is subjected to a treatment to make the shrink thread or shrink threads (4) shrink at least in said folding zone (5).

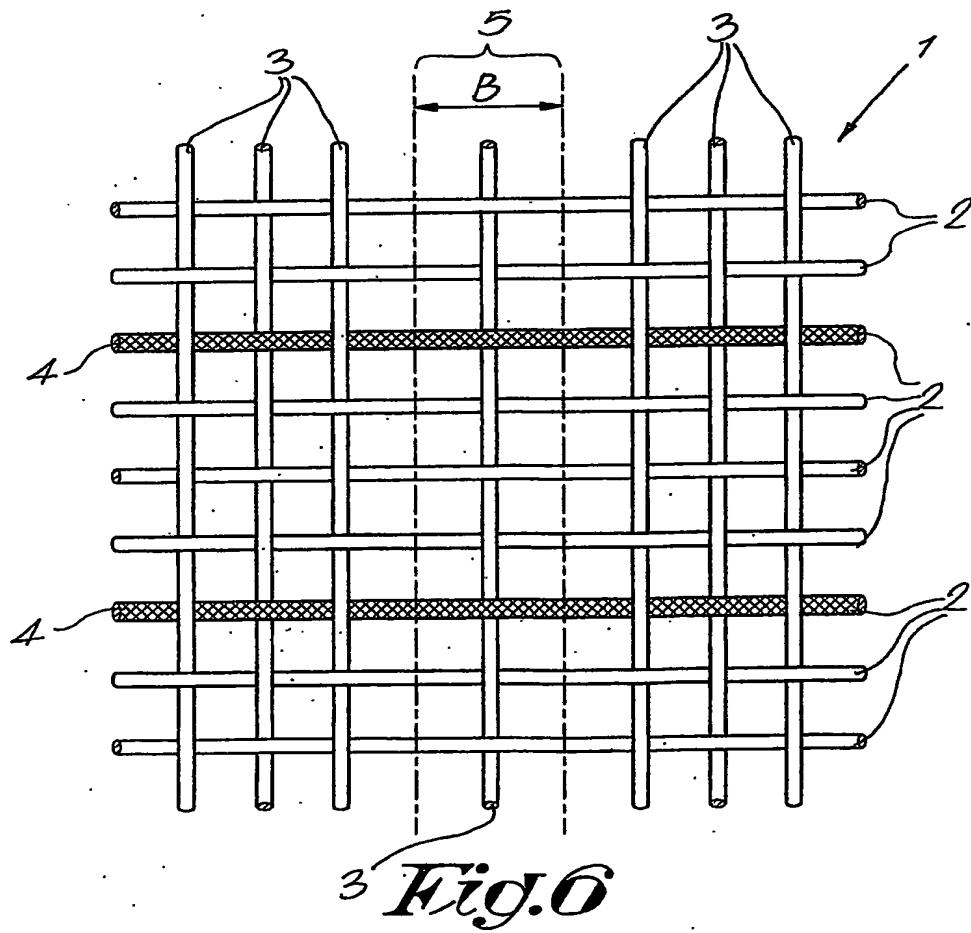
10. Method according to claim 9, characterised in that the entire cloth (1) is subjected to the treatment to make the shrink thread, shrink threads (4) respectively shrink.

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*Fig.5*



*Fig.6*

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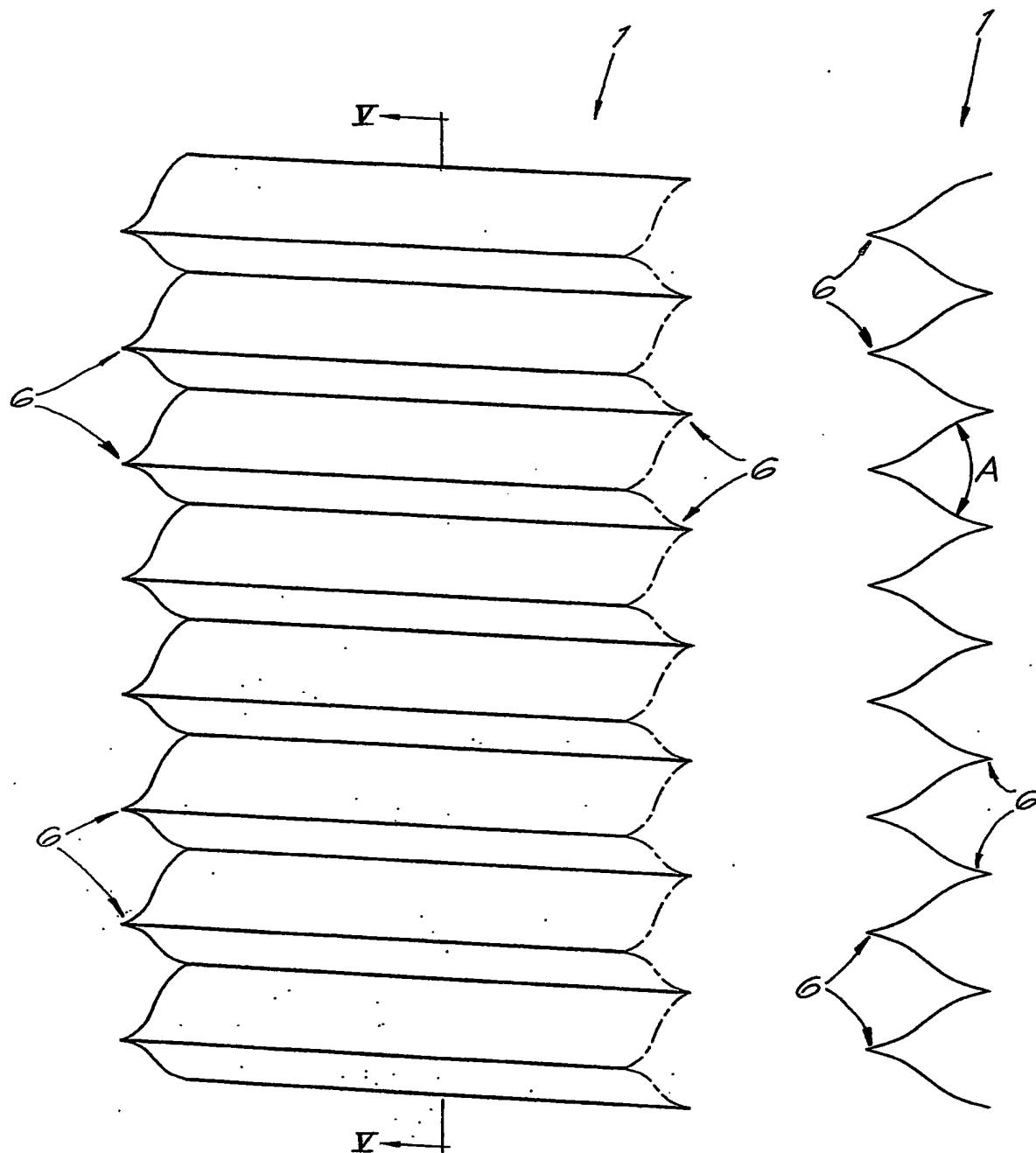


Fig.4

Fig.5

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/BE2004/000066

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 7 D03D15/04 D03D11/02 D06J1/00

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
 IPC 7 D03D D06J A41D D04B E06B A01G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 01, 31 January 1997 (1997-01-31) -& JP 08 226045 A (NIPPON WAIDO CLOTH KK; FUJII HISATOMI), 3 September 1996 (1996-09-03) abstract	1-6,8-10
X	US 2 627 644 A (B.H. FOSTER) 10 February 1953 (1953-02-10) the whole document	1,3,4, 8-10
A	DE 101 00 484 A (HAIBER GERD) 11 July 2002 (2002-07-11) the whole document	1-10

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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- \*A\* document defining the general state of the art which is not considered to be of particular relevance
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Date of the actual completion of the International search

31 August 2004

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International Application No  
PCT/BE2004/000066

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>DATABASE WPI            Section Ch, Week 198836            Derwent Publications Ltd., London, GB;            Class F03, AN 1988-252904            XP002267634            -&amp; JP 63 182446 A (KAWASHIMA ORIMONO KK)            27 July 1988 (1988-07-27)            abstract</p> <hr/> <p>GB 851 192 A (UNITED STATES RUBBER            COMPANY) 12 October 1960 (1960-10-12)            claims; figures</p> <hr/> <p>WO 03/087449 A (VIKTOR, G., BVBA)            23 October 2003 (2003-10-23)            cited in the application            claims 1-3,6,10-13,16-19; figures</p> <hr/> <p>PATENT ABSTRACTS OF JAPAN            vol. 1998, no. 01,            30 January 1998 (1998-01-30)            -&amp; JP 09 228209 A (KAWAGUCHI HOSOHABA            ORIMONO KK), 2 September 1997 (1997-09-02)            abstract</p> <hr/>	1-6,8,9
A		1-3,8,9
P,A		1,2,4,8, 9
A		

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International Application No PCT/BE2004/000066	
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Patent document cited in search report		Publication date	Patent family member(s)		Publication date
JP 08226045	A	03-09-1996	NONE		
US 2627644	A	10-02-1953	NONE		
DE 10100484	A	11-07-2002	DE	10100484 A1	11-07-2002
JP 63182446	A	27-07-1988	JP	1629022 C	20-12-1991
			JP	2053535 B	19-11-1990
GB 851192	A	12-10-1960	NONE		
WO 03087449	A	23-10-2003	BE	1014784 A3	06-04-2004
			WO	03087449 A1	23-10-2003
JP 09228209	A	02-09-1997	NONE		